Amputation Prevention

Powered Machine Hazard Control

Employer Guide

SGIA
Specialty Graphic Imaging Association

Table of Contents

Introduction

Within the printing industry, working with and around powered machines can be relatively safe when the equipment is properly guarded, safe work practices are established and followed, and when employees are effectively trained.

However, when severe impacting injuries to hands and arms are experienced these types of injuries can often result in amputation or other permanent disability. Severe injuries and amputations can occur from the use and maintenance of powered machines when unsafe work practices and non-compliant conditions are involved.

Over the years, too many severe injuries to fingers, hands and arms and those resulting in amputations have occurred in manufacturing which includes the printing industry, and most if not all, are preventable.

Any employee assigned to operate powered machines, perform minor service or extensive service and maintenance on those machines can be at risk for severe injuries or amputations. Measures to protect your employees from these hazards include proper machine guarding, the use of hazardous energy control procedures, and effective safety training.

Be Proactive

Being proactive with safety is an effective way to prevent workplace injuries and reduce the costs of doing business. The most effective safety programs are those where employers and employees work together, input from employees is promoted, and where all employees are fully trained to work safely.

First and foremost, when an employee gets seriously injured, you have to understand the trauma the injured employee endures. It can be devastating for the employee and their family. There is also a ripple effect of that human cost factor which involves the trauma to the other workers witnessing or hearing about the injury. Severe injuries and amputations can impact the whole company and greatly reduce employee morale.

On the business side you should be aware of the direct costs involved with severe injuries and amputations. Typical direct costs include higher workers' compensation insurance rates, expenses to pay fines due to regulatory violations, and the costs to correct the unsafe situation.

However, the indirect costs are not always as obvious or immediate. These hidden financial costs, for work place accidents can include:

- Lost productivity
- Delayed orders from interrupted operations
- Time and costs associated with hiring or retraining temporary or replacement employees
- Time investigating non-compliant equipment and/or operations
- Legal defense costs associated with civil and/or enforcement actions

By integrating safety and health into the overall management of your business, through effective development and implementation of safety programs and policies, you can reduce the risk of injuries and injury related losses.

Having a safe operation, employers remain in compliance and offer a safe work environment. More importantly their employees will be able to perform their daily tasks safely and effectively, which helps to prevent and reduce the risks of accidents and injuries, and ultimately allows employees to preserve their livelihood and future opportunities.

Employers can do their part by providing a safe workplace for their employees. In turn they can benefit from lower employee turnover and reduced lost time, reduced workers' compensation rates, increased productivity, and increased profit. Employees can do their part by following all the safety rules and procedures established for them and become the eyes and ears of safety for the company.

To assist you in developing a safety program with regard to powered machine operations, SGIA has developed this guide which includes an employer guide, training PowerPoint, safety posters, and an employee handbook. Together this information will help you understand how to identify and manage common hazards that can result in severe injury and amputations when operating and servicing powered machines.

While this guide presents a general discussion for machine safeguards, work practices and performance of hazardous energy control, you may also have additional and specific regulatory and legal requirements with regional, state, or provincial variations that you should consider and investigate to ensure full compliance.

Note: The safety information contained in this guide is not all inclusive and does not cover all safety compliance topics which may apply to your specific facility or operation. Further site specific material development and employee training would be necessary to satisfy regulatory requirements.

Understanding Why Accidents Happen

We use powered machines every day in our operations and unfortunately our industry has experienced severe injuries and amputations to fingers, hands and arms as a result of using that equipment. But why do they happen?

A used piece of powered machine may be acquired without the necessary guarding. Even with new powered equipment some employers and employees may remove a guard to perform a certain task, and then decide not to or forget to replace the guard. And in some cases we find an operator that feels it's "easier" or faster to run a job without certain guards in place or to use safety control procedures.

Any of these situations puts the employee and others at risk for amputation hazards.

Initially, every employer should have taken steps to ensure that any powered machine introduced into the operation is properly installed according to manufacturer specifications and that safe procedures were established so that machine operators are not exposed to hazards during production activities or exposed to hazardous energy during service and maintenance work.

Even with those initial efforts accomplished, hazards and risks for amputations can still exist.

Some of the common causes are related to missing or improper guarding, a lack of control measures for hazardous energy when performing service and maintenance, and some are related to unsafe work practices by the employees using the powered machines. Each of these causes can lead to the exposure of hazardous equipment motions and hazardous energy. You need to understand both exposures to understand why accidents happen.

Hazardous Equipment Motion

When a powered machine is placed in a run condition, the components of the machine are moving to process materials and depending on the type of equipment, it can create a variety of hazardous motions that must be guarded to prevent contact by employees. If the necessary guarding is removed and not replaced, broken, or not properly aligned, an employee can be exposed to extreme hazard points. The most common experiences with severe injuries when running machinery are being struck-by, pulled-into, or caught-by the machine parts.

It cannot be stressed enough that a powered machine's movement is always faster than a humans' movement, and accidents happen faster than any person can react.

The hazard points for machinery exist in three primary areas:

- Point of Operation- The area of the machine where the machine performs work - i.e., mechanical actions that occur at the point of operation, such as cutting, shaping, forming and pressing.
- Power-Transmission Apparatus – All components of the mechanical system that transmit energy, such as flywheels, pulleys, belts, chains, couplings, connecting rods, spindles, cams, and gears.
- Other Moving Parts – Parts of the machine that move while the machine is powered and operating, such as reciprocating, rotating, and transverse moving parts as well as lead mechanisms and auxiliary parts of the machine.

The following are examples of typical hazardous equipment motions that can exist with powered machinery in our industry.

Rotating Motion – Is a circular motion that is generated by rotating collars, couplings, cams, clutches, flywheels, shaft ends, and spindles that may grip clothing, hair, or otherwise force a body part into a dangerous location. Even smooth surfaced rotating machine parts can be hazardous. Projections such as screws or burrs on the rotating part increase the hazard potential.

The rotation motion of machine drive components like main drive shafts and guide rollers spin at a very high speed and if touched, can pull in a person's hand or arm. Also, inadvertent contact involving long hair or loose clothing can be equally as hazardous as the person is dragged further into the machine and a wrapping effect around the shaft is experienced causing de-gloving, scalping and fatalities.

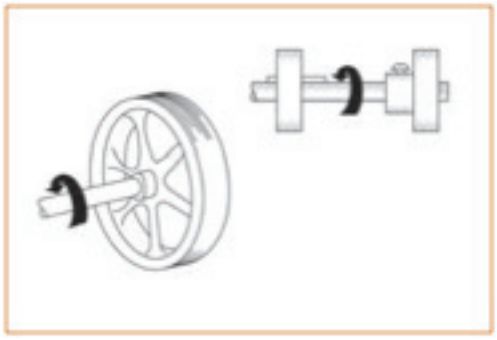

Figure 1

Reciprocating Motion – Is a back-and-forth or up-and-down motion that may strike or entrap an employee repeatedly between a moving part and a fixed object.

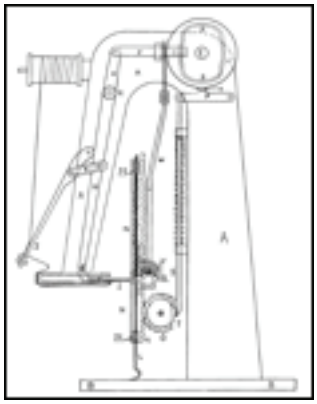

Figure 2

Transverse Motion – Is a motion in a straight, continuous line that may strike or catch an employee in a pinch or shear point created by the moving part and a fixed object.

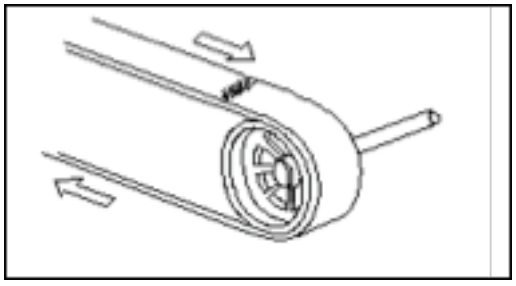

Figure 3

Cutting Action – Is the action that cuts material and the associated machine motion may be rotating, reciprocating, or transverse.

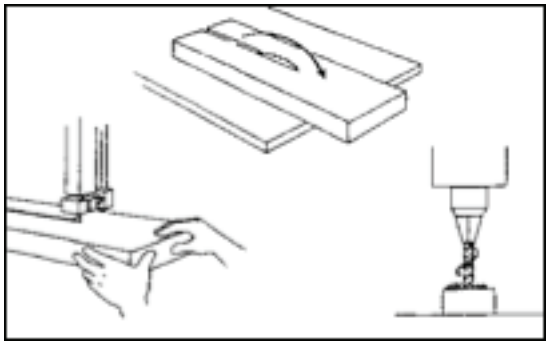

Figure 4

Punching Action – Begins when power causes the machine to hit a ram to stamp or blank materials. The hazard occurs at the point of operation where the employee typically inserts, holds, or withdraws material by hand.

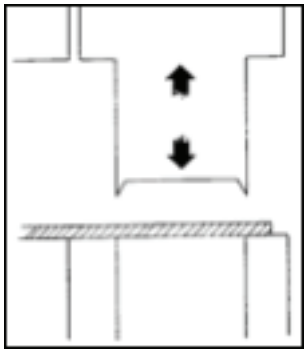

Figure 5

Shearing Action – Involves applying power to a slide or knife in order to trim or shear material. The hazard occurs at the point of operation where the employee typically inserts, holds, or withdraws the stock by hand.

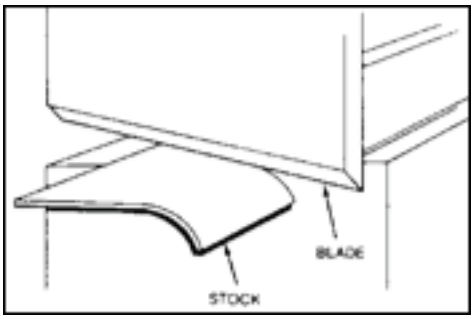

Figure 6

In-Running Nip Points – Also known as "pinch points," develop when two parts move together and at least one moves in a rotary or circular motion. In-running nip points occur whenever machine parts move toward each other or when one part moves past a stationary object. Typical nip points include gears, rollers, belt drives, and pulleys.

In-running nip points are probably the largest cause of amputations and severe injuries to fingers and hands.

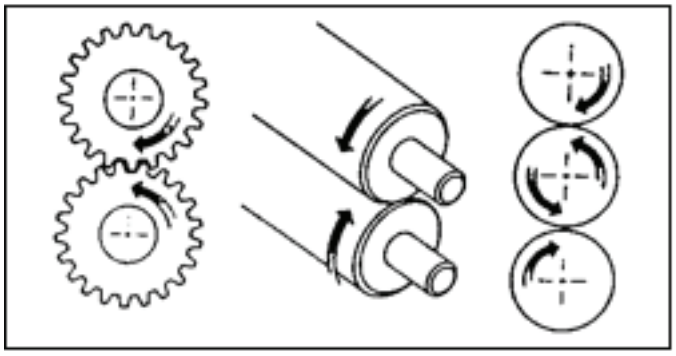

Figure 7

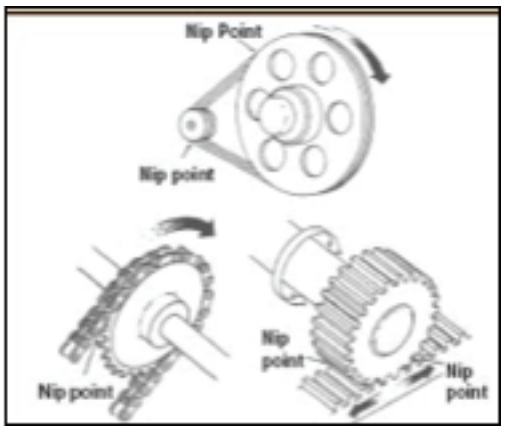

Figure 8

Hazardous Energy

When a powered machine is stopped in a normal fashion by turning it off by a simple "on-off" switch, the assumption too many employees make is that the "energy" is removed and the machine parts won't start up. However, this is not the case at all. The energy which enables the machine to run and move its components still exists, and the machine is only in a condition referred to as "zero speed".

In this "zero speed" state, the powered machine may not be moving but is not in a "safe" condition either. Basically the powered machine is still engaged and ready to run. The potential for the machine to quickly restart and/or move can happen if someone engages the "on" or "run" control, if the machine finishes a cycle motion, or if the equipment experiences a fault.

To be in a safe condition there would need to be redundant controls used to disengage the machine and prevent it from returning to ready/running condition (moving state). More on this will be discussed later under the Preventative Measures section of this guide.

When authorized employees perform service and maintenance activities, those tasks can take place when the machine is coming out of production, or during idle periods of operations. In either case, the hazards these employees can be exposed to are less visible for the fact that the equipment parts are not running (moving), but energy is still present.

That energy is known as "hazardous energy". It's called this because the energy sources themselves have the potential of harming a person, and that energy (if not controlled) has the ability to re-engage the machine and cause movement of its parts, resulting in hazardous equipment motions and ultimately, the potential for severe injuries or amputations.

The following are descriptions of the typical hazardous energy sources present in our industry. Keep in mind that other energy sources can exist in your operations and may require further investigation for proper control.

- **Electrical energy** – This is the most common form of energy used with machines in our industry. It can be present through power cords/lines and it can also be stored as with batteries or capacitors. In addition to the risk of this energy engaging a machine to move its parts, the hazards with electrical energy can include electrical shock, exposure to arc blast/flash, secondary injury (burn, falls, amputation, etc.) and death.
- **Hydraulic energy** – This is the energy that would be stored by a highly pressurized fluid. It can be present in pipes and hoses leading to and within machines. Under pressure, hydraulic fluid can move heavy objects and machine components such as piston lifts, power presses, clamps and rams. In addition to the risk of this energy engaging a machine to move its parts, the hazards with hydraulic energy if released in an uncontrolled manner, can cause severe punctures to a person's hands and other body parts.
- **Pneumatic energy** - This is the energy that would be stored by highly pressurized air or gas. It can be present in pipes and hoses leading to and within machines. Similar to hydraulic energy, when under pressure, the air or gas can move heavy objects and machine components such as pumps, spray devices, jacks and lifts. In addition to the risk of this energy engaging a machine to move its parts, the hazards with pneumatic energy if released in an uncontrolled manner, can cause severe punctures to a person's hands and other body parts.

- **Mechanical energy** – This is the energy contained in a machine component that is under tension. It can be present for example with a spring that is compressed; having stored energy, which when released will form movement as the spring expands, or in a fly wheel within a top heavy cycle. In addition to the risk of this energy engaging a machine to move its other parts, the hazards with mechanical energy if released in an uncontrolled manner, can cause a person's hands or other body parts to be severely crushed or struck, with the possibility of a fatality.

Any of these energy types can be the primary energy source to a machine, or present as residual or stored energy (energy remaining in a machine system). The primary energy source is the power supply that is used to run the machine or system. Residual or stored energy is the energy that is not being used for the entire system and it can remain after the primary energy is isolated, but when released, it can cause some machine operations to function.

Some equipment will use several sources of energy and a machine system can integrate them so that if the primary energy is shut down, all other secondary or residual energies will also be depleted. In other cases, especially with older machines, the individual energy sources operate independently and require specific bleeding of the residual energy.

For example, some guillotine cutters will use electricity as the primary energy source and have hydraulic and pneumatic energy for peripheral functions. Shutting down the electrical energy may not shut off the air or hydraulics. Special valves would have to be used to bleed out the fluid and air.

Too often accidents happen when a machine is not properly assessed for hazards or if the means to control hazardous energies are not identified.

Unsafe Work Practices

Machine guarding and hazardous energy controls are certainly important, but a key element to safety with machinery is the employee's knowledge and decision when working with and around machines.

Whether an employee is operating a machine for production, interrupting production to perform minor service, or if they are required to conduct extensive service and maintenance, it's during these times that the employee must rely on available safety information and make some critical decisions about how to perform these tasks.

Operator error, lack of supervision, or a misjudgment on the part of the employee is a large contributor to amputation risks. While a guard is in place, it should provide a physical barrier between a machine operator and a hazard area. A properly established safety procedure can provide instruction as to how to perform a job safely. But the critical link lies with the employees' decision to maintain guards, pay attention to the job at hand, and follow those safety procedures.

It's because machines create hazardous motion which can lead to the risk of amputations, that both employers and employees must understand the hazards and why they put machine operators at risk.

Our industry is fast paced and competitive. Too often there is the sense among employees that short cuts and quick skills are necessary traits for getting the job done. That mind-set is a leading cause for senseless accidents.

Here are some samples of unsafe work practices with machinery:

- Using machinery without authority
- Operating machines in violation of established safety procedures
- Removing or disabling guards or other safety devices
- Using hands instead of appropriate safety tools
- Repairing or performing minor service when not authorized
- Repairing or performing minor service when machinery is in motion or energized

With new equipment and technology in safety devices, there is also a false sense of safety that drives employees to feel they can perform tasks that are very dangerous, simply because they have a trip guard or Stop/Safe control at hand. However, those controls are not intended to stop an accident from happening. As we mentioned before, powered machines move faster than a humans' movement, and accidents happen faster than any person can react. Even if an employee engages a safety device after they realize they made a mistake, they may eventually stop the machine, but not before that employee is harmed by the machine.

And for machine operators who feel they only need to use a Stop/Safe control before performing extreme service and maintenance activities that would normally require full energy controls, that decision is not only unsafe for that employee, but can put others at risk as well.

There can be a variety of reasons why unsafe work practices exist. The following are the most typical reasons for this issue in our industry.

Poor Safety Training

As we will explore later in this guide, employees must know their responsibilities and follow the rules and policies that you establish. There is no substitute for employee training for a successful safety program.

In order to allow the employees to make the right decisions, they need to have the right information. Employee training should combine site specific instructions on the hazards present at their workplace and the preventative measures they can take to protect themselves. Without this basic information employees will be working in the dark.

Proper employee training for machinery operations should include the elements of all regulatory requirements, company policies and recommended practices. Generic training, while able to give basic elements of a requirement, fails to provide the site specific information on how the employee can apply the information to their work.

Training should also address proper communication. This would cover the means established to report any unsafe conditions or circumstances to supervisors and staff. The ability to report such issues as missing guards or inefficient/outdated procedures, allows for a progressive safety program and a proactive way to avoid severe injuries and amputations.

Further, it's important to develop effective communication between employees working on machinery in order to signal other employees about certain activities such as troubleshooting, setup activities, minor service, or extensive service and maintenance repairs taking place. Proper communication safeguards everyone involved.

Comfortable Behavior

As with any business, you can have employees that have been with the company for a long time, sometimes performing the same job for many years. Over time these employees get very skilled but they can also get very comfortable in their work. They may feel they know enough or that they have developed tricks that work better than the safety procedures developed. But when it comes to safety, it's not a question of experience. The goal should be to keep it fresh and on their minds.

It's not meaning to have employees afraid of their machines or the tasks they perform, but rather remind them of the importance and risks of comfortable behavior. Hazards do not pick their victims. If an employee working on a machine is not paying attention or takes unnecessary risks, it's a gamble they will eventually lose and the cost can be a severe injury, disability, or amputation that will stay with them all their life. That's a cost no one can afford.

Safety Misconduct

Finally, there are those employees who know the rules but feel they have seen it all and they don't think they will get hurt on the job. Or there can be employees that are simply distracted for one reason or another and they fail to follow a safety rule. Both are dangerous situations.

Some employees can also feel that in order to keep up with production demands, they have to take the short cut, remove the guard to more easily grab the product off a line, or neglect to lockout out the machine before conducting repairs.

Whatever reason, if there is misconduct regarding safety at your facility, it puts everyone at risk. That behavior can tell other workers that it's ok to skip a procedure or not follow a rule designed to protect them. It can lead to bad habits that will be harder to change the longer it goes on. Further, if left unchecked, such misconduct can be viewed by a regulatory agency as the employers fault and assess costly penalties.

Even if an accident has not occurred because of misconduct related to safety, chances are there were many unreported close calls, which will eventually catch up to that employee or others in terms of a severe injury or worse.

Where Severe Injuries and Amputations Occur

As we have explained, working with and around machinery has a certain amount of risk. Some machines have more hazards than others. This has as much to do with the age and design of the machinery as it does with modifications and how the machinery is used and maintained.

The following machinery used in the printing industry all have been associated with amputations or have the potential for severe injuries and amputations. Consequently these machines are also the type most regulatory agencies recognize as amputation contributors and therefore, should be your focus as well to ensure they are compliant.

Automatic Screen Printing Presses

Pinch points, struck-by, and crushing hazards are present when operating the machine; cleaning the machine; clearing the press of scrap material; setting up jobs; performing minor service tasks; performing service and maintenance

Embroidery Machines

Puncture hazards are present when operating the machine; changing needles; making equipment adjustments; setting up jobs; clearing the machine of scrap material

Pinching hazards are present when making adjustments; performing minor service tasks; performing service and maintenance

Die Cutters/Letterpress

Pinch points, struck-by, and crushing hazards are present when operating the machine; setting up jobs; making adjustments; clearing the machine of scrap material; performing minor service tasks; performing service and maintenance

Cutting hazards are present when installing and removing dies; operating the machine, handling die cases

Woodworking Machinery (e.g., band saws, table saws)

Cutting hazards are present when operating the machines; installing and changing blades; making adjustments; clearing jammed stock; performing minor service tasks; performing service and maintenance

Routers/Drills

Rotating and cutting hazards are present when operating the machines; installing and changing bits; clearing jammed stock; performing minor service tasks; performing service and maintenance

Laminator

Pinch points and nip point hazards are present when operating the machine; feeding material into in-running nip points; clearing jammed material; performing minor service tasks; performing service and maintenance

Flat Bed Plotter and Cutter

Pinch points, crushing, and struck-by hazards are present when operating the machine; making adjustments; clearing jammed material; performing minor service tasks; performing service and maintenance

Guillotine Cutters

Shearing, cutting, and crushing hazards are present when operating the machine; clearing stock; clearing jammed material; installing and changing blades

Conveyors

Pinch and shear hazards are present when utilizing this equipment; clearing jammed material; performing minor service tasks; performing service and maintenance

Other Non-Production Equipment

The following equipment can also involve struck-by and crushing hazards and contribute to amputation hazards. Depending on your actual operations, you may not have these pieces of equipment used or installed. However, if after assessing your operations, you discover any of these, or if you ever temporarily rent or lease any of this equipment, you should evaluate them for compliance and proper safety devices.

- Aerial Lift Platforms
- Cranes/Hoists
- Industrial Powered Trucks (Forklifts)
- Mowing Machines
- Packing, Wrapping, Bundling Machinery

Employers should ensure that all powered machines are properly installed so that employees using the machines are not exposed to hazards during operations or hazardous energy during service and maintenance activities.

Basic Prevention Measures

The first step toward effective preventative measures is to comply with all appropriate regulations specific for your location, facility and operations. You should also develop an overall safety program to ensure a safe and compliant operation.

In the U.S. and Canada employees are protected by a series of regulations that will cover a variety of work practices and exposures to hazards. It is your responsibility as a print shop owner to assess your individual worksite and determine what regulations apply to your specific location and operations. This guidebook discusses operation assessment later on.

So far we have discussed why amputation accidents happen and where they occur with certain powered machines. The next step is to understand the preventative measures that can be taken to reduce or eliminate the risks of amputations. Basic preventative measures fall into the three areas of machine guarding, hazardous energy control procedures, and work practices.

Machine Guarding

The main purpose of machine guarding is to prevent contact, either directly or inadvertently, with the "danger zone" while a machine is running or is being operated. To achieve this, it may take several types of guarding together to protect an operator from hazards.

Additionally, all machine guarding must:

- Be secured in place or otherwise be tamper proof – Machine guards must be secure and not easily bypassed, removed, or tampered with.
- Be constructed of substantial material and design in order to withstand the environment and conditions where the guard is to be installed and used.
- Create no new hazard – A safeguard is not compliant if it creates another hazard of its own or creates a new exposure due to poor design or placement.
- Not interfere with machine operations - Any safeguard which impedes production may cause the employee to remove or disregard the existing guards.

Since most government regulations do not address industry specific equipment or call out specific machine design, these regulatory agencies will often refer to industry standards to determine particular requirements or recommendations. Therefore, it's strongly suggested that you determine whether your machines meet the applicable ANSI or ISO standards. More on the subject of ANSI and ISO standards is discussed in the "A Word About Consensus Standards" section of this guide.

It's also important to verify that the machinery is in its original equipment manufacture's condition. In other words, are all of the guards and safety devices that were installed by the manufacturer in place and working as originally designed?

There are two basic categories of guards, fixed and movable. The following are examples of both types used on machinery found in our industry.

> **Note**: Fixed guards should always be secured with a sufficient number of fasteners such as screws or bolts that require a tool for removal of the guard.

Nip Guards

This type of guard is also called a nip bar or finger guard and would be installed at an in-running nip of the machine. These guard types are fixed guards but they can be adjustable as they can get out of alignment with continued use. The purpose of a nip guard is to keep a finger or hand out of an in-running nip point by deflecting the finger or hand away from the nip point.

It's critical for the nip guard to be in the right position to be effective and not create a more dangerous condition like getting a finger or hand caught between the nip guard and the rollers creating the nip point

Barrier Guards

Barrier guards can be designed as fixed or movable guarding.

Fixed barrier guards (or any fixed type guard for that matter) are designed for areas where infrequent access is required and access is generally not permitted while the machine is running.

Examples of fixed barrier guards include panels, maintenance covers, and power-transmission apparatus (i.e., flywheels, pulleys, belts, chains, couplings, connecting rods, spindles, cams, gears, etc.)

Movable barrier guards are designed to allow them to be opened, moved out of place, or removed for more frequent access for various tasks. Moveable guards generally do not require a tool to gain access. Examples of movable barrier guards include gates, door hatches, and clean-out panels.

Some barrier guards are designed with slots or other openings, such as for viewing. In order to maintain a safe protective distance from the hazard area any guard opening should be sized so that it prevents contact by an operator to the hazard area or point of operation hazard. The following chart can be used to determine the safe opening width in relation to the distance of a point of operation hazard.

Distance from opening to point of operation hazard (mm)	Maximum width of guard opening (mm)
< 38	6
> 38 and < 63	9
> 63 and < 89	13
> 89 and < 140	16
> 140 and < 165	19
> 165 and < 190	22
> 190 and < 317	32
> 317 and < 394	38
> 394 and < 444	48
> 444 and < 800	54
Over 800	152

Interlocks

While these devices can be a part of a guard, and are often misidentified as a "guard", they are really considered a control device and this is discussed further below under the section on Safety Devices.

Fence Enclosures

These types of guards typically involve large panels of solid material (sometimes Plexiglas), railings and chained bollards. They are designed to keep employees from accessing a hazard area, hazardous machine operation, or protect pedestrian employees from flying debris.

This type of guarding is also known as guarding-by-location where, because of the placement of the fencing, the hazard is no longer accessible due to the location of the fencing (guard).

Fence enclosures are effective and popular when placing guards directly onto a machine is particularly difficult as with older models of die cutters and some early designs of guillotine machines. However, keep in mind that in these situations, the machine operator is inside the fence enclosure and would need special and more detailed training to protect them from machine operation hazards. Further, additional guarding or safety devices may be required on the machine itself in order to provide the necessary protection to the operator.

Guarding by Location

This method of safeguarding involves locating the machine or machine components so they are not accessible to the operator during production activities. This is sometime accomplished by placing machines against a wall or fence.

Awareness Barriers

These are similar to guarding–by-location and fence enclosures but they do not provide any physical protection, but serve more as a reminder to employees and other personnel that they are approaching a hazard area. These barriers are often installed with rope, chains, and flags with a caution sign attached. These types of barriers are not recommended for areas where continual exposure to a hazard exists.

Safety Devices

Safety devices are additional safety components that are securely attached to a machine or to a permanent physical structure that is electronically connected to the machine, which when activated, will stop the drive control circuits and stop the machine motion and/or machine cycle. The following are typical safety devices available:

Two Hand Controls

These types of controls place control buttons at a predetermined safety distance which require concurrent and continued use of both hands to activate a machine motion or function. The design is to prevent the hands of an operator from entering a hazard area or point of operation.

Interlocks

An interlock is a safety device that is designed to stop a machine through a system when a guard is opened and not automatically re-start when the guard is re-closed. These are typically considered the lowest level of a safety device which can sometimes fail due to debris and normal wear and tear. They can also be easily defeated and therefore should not be relied upon as the sole safety device.

Safety Trip Wire/Cords

These controls operate similarly to interlocks and trip bars except they are installed as flexible, but taut, wires or cords. They are installed through a machine where fixed or rigid devices are impractical. They are commonly installed between the platens of screen printing presses.

Trip Bar

This is a movable protective bar that is usually located before a hazard zone that, when pushed or bumped, activates a safety system of the machine and stopping the motion of the machine.

Light Curtains

These devices are the most versatile to apply in our industry. Light curtains are designed specifically for a focused area, such as for point-of-operation safeguarding. Properly placed, these devices provide protection for operators during production activities in conjunction with other guarding and safety devices.

Area Sensing Lights/Beams

These controls are connected to the machine's control system and are designed to stop machine motion when the sensing field (photoelectric or electromagnetic) is broken or disturbed. These units can be adjusted to fit different machine foot prints or a group of machines. It should be noted that area sensing light devices are designed specifically for perimeter or area safeguarding. They cannot be used for point-of-operation safeguarding.

Pressure Sensitive Mats

These control devices are typically placed around a machines hazard area and used to prevent a person from walking into the area. They operate as other safety trip guards in that they will stop the machine operations and motion once the mat is walked on and the sensing control is activated.

Stop/Safe Controls

These controls are safety push buttons that can be placed throughout various locations of a machine and are designed to be operator initiated to stop the machine operation and all hazardous motion of the machine. At the same time the control also places machine in a "safe" condition.

E-Stop Controls

These controls are safety push buttons that can be placed throughout various locations of a machine and are designed to be operator initiated to stop the machine operation and all hazardous motion of the machine as quickly as possible, without creating an additional hazard. At the same time the control also places machine in a "safe" condition.

Hazardous Energy Control (Lockout/Tagout)

When a machine requires extensive repairs, service or maintenance, an employee may need to access areas of the machine where exposure to machine movement or hazardous energy such as electrical, mechanical, hydraulic, and pneumatic sources are present.

In these situations the employee could be at risk for severe injuries, amputations, or death if exposed directly to the hazardous energy sources or if the hazardous energy causes the machine to unexpectedly start, move or engage. In these cases, the employee must be protected through the use of hazardous energy control procedures. This is also known as lockout/tagout.

In short, lockout/tagout is a set of procedures established to disable specific machinery and prevent the release of hazardous energy while employees perform servicing and maintenance activities, thus protecting the employee from hazardous machine motions and impacts of the hazardous energies.

Lockout/tagout needs to be applied whenever an employee removes or bypasses a guard or other safety device, whenever a task requires an employee to place any part of their body into a point of operation, or when other machine operating cycles can exist.

To comply with basic regulatory requirements and ensure employee safety with service and maintenance activities, you must develop, implement, and enforce a written lockout/tagout program. An effective lockout/tagout program includes written hazardous energy control procedures for each applicable powered machine, annual procedure reviews, and specific employee training.

Note: Because there can be additional or variable regional, state, or provincial regulatory requirements, you should further investigate and review all applicable laws for your facility location and circumstances regarding lockout/tagout regulations.

A standard lockout/tagout program should include the following elements:

- Scope of the lockout/tagout program
- Explanation of the lockout/tagout regulations
- Definition and responsibilities of an Authorized Employee
- Explanation of a group lockout policy (if applicable)
- Explanation of shift change policy (if applicable)
- Policies regarding use of outside contractors with lockout/tagout
- Identification of all minor services tasks and associated procedures
- Description of employee training elements
- Explanation of re-training policy
- Description of annual review policy

A standard energy control procedure should include the following elements:

- Specific machine identification
- Standard shut down sequence
- Standard restoration sequence
- All hazardous energy types and associated magnitude of energies
- Energy shut off descriptions and means to isolate energy source(s)
- Verification steps

An energy control procedure template is available in the downloadable resource documents provided as part of this guide.

To supplement a basic lockout/tagout program you will also need to have enough of the following devices and equipment on hand to handle each applicable lockout/tagout task:

- Locks
- Tagout tags
- Lockout devices (attached to each applicable machine)
- Alternative access for other energy isolation devices (as needed)
- Clearly labeled isolation devices (i.e., breakers disconnect switches, control valves, etc.)

As will be mentioned in the section on Employee Training, employees authorized to perform lockout/tagout (Authorized Employees) will need to be identified specifically and trained on when hazardous energy control procedures apply and how to properly apply them.

The following is a brief description of basic lockout/tagout steps for shutting down a machine and isolating the hazardous energy:

1. Notify all Affected Employees and others that service is needed and a shut-down will occur.
2. Review machine specific energy control procedures for the methods to control the energy.
3. Shut down machine by the normal stopping procedure.
4. De-activate the energy isolating device(s) from the energy source(s).
5. Lock out the energy isolating device(s) according to control procedures.
6. Dissipate stored or residual energy by methods specified in control procedures.
7. Verify machine is disconnected from the energy source(s) according to control procedures.
8. Return operating control(s) to neutral or "off" position after verification.

The following is a brief description of basic lockout/tagout steps for restoring a machine to operation after the service and maintenance is completed:

1. Ensure that nonessential items, tools and personnel are removed from the work area.
2. Ensure that the machine components are operationally intact.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and reenergize the machine.
5. Remove any means of blocking if used.
6. Test and ensure that the machine is operating correctly.
7. Notify Affected Employees and others that the service is complete.

Minor Service Activities

As with any production activity there will be the occasional requirement to perform some small task that will interrupt production operations. These tasks may not take long to perform or involve any extreme access to machine areas or require extensive disassembly of the machine. These tasks would not be production activities, nor are they full service and maintenance. These are called "minor service" activities.

Common minor service tasks can include some cleaning activities, clearing of minor jams, certain lubricating tasks, minor adjustments, or clearing of scrap waste.

These activities can qualify as minor if they are shown to be routine, repetitive, and integral to the use of the machine for production, and that alternative measures providing effective protection are used.

While called minor, these activities can still involve the exposure of hazards to the employee or machine operator. Therefore, some special considerations must be understood and implemented.

- Assess each powered machine to identify applicable minor service tasks required
- Determine if the machines identified with minor service tasks have the correct controls
- Assess and identify any other applicable alternative protection techniques
- Always stop the equipment before performing any minor service activities
- Always use a Stop/Safe or E-Stop safety control before attempting any minor service activity
- If multiple employees are performing a minor service task on the same machine, each should activate their own Stop/Safe or E-Stop control
- Never rely solely on an interlock as a safety control to perform minor service tasks

Regarding the need for alternative protection, there is a method that can be used when the particular machine has the appropriate safety controls and configuration. That method is known as the Inch-Safe-Service method.

This method, when practiced correctly, can allow the machine to be energized and still allow the employee to perform certain minor service activities safely by using machine controls in a specific manner and sequence.

In order to utilize the Inch-Safe-Service method, your machines must be equipped with the necessary safety controls and safety devices in sufficient number and locations. Further, you should record all minor service activities you develop and established for a particular machine and document any alternative protection techniques you require and have established.

The steps involved with the Inch-Safe-Service method are as follows:

1. Before performing minor service, stop the equipment and then activate the stop/safe control(s).
2. Ensure that all materials, tools, and personnel are clear from the machine.
3. De-activate the stop/safe control(s) and proceed to use an "inch" control to move the machine components to the desired position.
4. Immediately activate the stop/safe control(s) before resuming the minor service activities.
5. Repeat steps 3 and 4 as necessary until the minor service is completed.

Work Practices

Work practices are those acts that an employee makes while performing their job. The key is to make the employee aware of safe work practices and require them to follow those practices. Keep in mind that work practice do not replace machine guarding or hazardous energy controls, and vise versa. Safe work practices are an integral part of all safety devices and procedures being effective.

The following are common safe work practice elements to address and implement into your overall safety programs, but specifically into your machine operation and energy control oversight:

Employee Training

While the topic of training is explored under the section on Employee Training within this guide, we are providing some core elements to consider regarding work practices.

Every employee that is permitted to operate a machine must be given adequate training to know how to operate the machinery safely. Operators and other assistant employees should understand the purpose and function of all production controls as well as the safety controls for a particular machine. This would especially include knowing how to stop the machine in case of an emergency.

Employees who have not received proper training should never be allowed to operate machinery.

With respect to lockout/tagout, only authorized employees can be permitted to perform any level of service and maintenance on machinery.

Because work practices enhance guarding and hazardous energy control procedures, employee training should always include identification of hazards associated with a particular machine, specific safeguards in place to protect the employee, circumstances when guards and lockout/tagout are used, when guards can be removed, and how to utilize minor service alternative safety procedures.

It's important to ensure that employees are able to demonstrate their ability to run the machine properly as well as demonstrate an understanding of all safety precautions and safety devices.

Proper Housekeeping

Machine operators have experienced injuries when they have tripped and fallen onto and into moving machine and moving parts. Keeping the area around machinery clear of debris, obstructions, scraps, and other hazards helps reduce the potential for inadvertent contact with machinery during production and minor service activities.

Personal Attire

It should be a standard policy to never allow employees to wear loose fitting clothing or long hair. As it was mentioned under the section on Why Accidents Happen, loose clothing and long hair can be easily caught by moving and rotating machine parts, resulting in the employee being pulled into the machine, resulting in being de-gloved, or scalped.

Machine Inspections

Part of having a safe machine is to have it properly maintained and operating. This is accomplished through regular inspections before each shift and periodically throughout the year. Inspections should include the overall condition of the machine, guard placement and condition, as well as the operation of all safety features, controls and devices.

You need to ensure that each machine is equipped or otherwise outfitted with the safety equipment and devices necessary to perform production, minor service, and service and maintenance activities safely. Your machine inspections should be documented to maintain a record of issues and corrections for future reference and identification of hazard trends. Documentation should identify the machine, inspection date, problems noted, and corrective actions taken.

Any deficiencies discovered should be communicated to supervisors immediately as well as all applicable employees. This would include communicating with impacted employees on each shift where the machine is located so as to avoid additional safety issues or potential injuries.

Operate as Designed

Employees assigned to machinery should only be allowed to use the machines as designed. All machine parts, safety equipment, and safety devices should be kept in place and used in accordance with the manufacturer specification. In other words, employees should not be permitted to remove any guards or safety devices unless authorized and documented as to the reason.

Further, machine operators should not be allowed to or expected to operate a machine if any of the guards or other safety devices are not functioning properly or are missing.

If when you conduct your individual assessment, you discover unsafe work practices beyond those described in this guide or find other safe work practices you can implement, you should record these and include in your site specific safety program and employee training sessions.

A Word About Consensus Standards

Both industry and regulatory agencies recognize the value of industry consensus standards as guidance for safe design and practices with regard to machinery and prevention of amputations.

Consensus standards are voluntary in nature, meaning there is no regulatory requirement to follow such standards. However, some agencies will cite these standards by reference in their regulations or through enforcement actions. Therefore, getting familiar with these standards is advised.

Each consensus standard is developed by industry stakeholders within a specific industry. These standards, while initially developed as design standards, are meant to be used by the end-user of equipment as a reference guide when purchasing, reviewing, upgrading, repairing, and modifying equipment.

The two main consensus standard bodies that authorize the development of safety standards for our industry and referred to by regulatory agencies are the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). Depending on the equipments manufacturer origin, it may be a specific ANSI or ISO standard that applies which can provide you with useful guidance on safety features and devices necessary for the protection of your employees from hazards as well as assisting in the compliance of regulatory standards.

There are ANSI and ISO standards that cover, in general, printing presses, bindery and finishing machines, converting equipment and die cutters. The most commonly used and referenced ANSI and ISO standards are listed under the "References and Considerations" section of this guidance.

> Note: The ANSI and ISO standards discussed within this guidance are not inclusive. There may be other standards for machinery and equipment that are associated with hazard risks.

While these standards are developed for a particular industry, they do not cover or identify a specific make or model of machinery, but rather the type of machine and its general function. For example, most of the standards will look at general safety devices and configuration of safety applications. Users of such equipment should reference these standards or require the equipment manufacturer to comply with the applicable standard to further insure safe operations and better regulatory compliance.

Most consensus standards cover more details of machinery and can help you understand and apply controls or preventative measures to eliminate or reduce amputation hazards. Topics addressed can include operating procedures, machine guarding use and location, warning devices, and emergency controls (e.g., Stop/Safe and E-Stops).

Both ANSI and ISO standards go through revision cycles every five years and are able to present current safety information addressing an industry's specific equipment and changing technology. Following the most recent version of an industry consensus standard is therefore the best practice.

Since general regulatory standards take longer to develop and are most times not industry specific, regulatory agencies have used appropriate consensus standards in conjunction with an applicable regulation to address compliance and safety solutions.

In most cases, a specific industry ANSI/ISO standard is used to assist an employer in determining hazard exposure and preventive measures with machinery. However, as an employer, your first responsibility is to ensure that you comply with all applicable compliance requirements as directed by the regulatory agencies that would oversee your operation.

Also, complying with an ANSI or ISO standard does not guarantee that you will be in compliance with a government regulation. Your first obligation is to conduct due diligence to ensure full compliance with applicable regulatory rules and laws.

Conducting Employee Training

In order to have a successful safety program and have it function as intended, your employees must know their responsibilities and follow the rules and policies that you establish. This is accomplished through effective employee training. There is no substitute for this element of your safety program.

Proper training on the use and care of machine guarding, the purpose and application of hazardous energy control procedures, and the use of safe work practices teaches your employees on how to protect themselves against severe injuries and amputations when working with and around printing and other powered equipment.

The goal of safety training with regard to machine operation and maintenance should be to ensure safe production, understand actual and potential hazards, and know the measures to take for preventing exposure to risks and hazards.

As we mentioned previously, human error is a cause for many of the accidents experienced. Whether it's using unsafe equipment, performing unsafe practices or simple employee ignorance of the necessary safety aspects, they are all contributing factors to injuries and amputations that can be avoided through training.

Safety training on machine operation, guarding, and maintenance activities, needs to be provided to all applicable employees. However, experience has shown that newly hired employees and those that have been on the job for many years are most at risk. New hires are just getting their skills developed and need more supervision and practice. Those with more experience can become too comfortable around machinery and may need refresher training to stay aware.

Ideally, any safety training should begin before the employee performs their operation duties. Orientation is one method to get new employee started with safety information. Continued safety training can be accomplished through on-the-job or with periodic safety training sessions scheduled as necessary.

Another element to consider is that today's equipment used within printing facilities can have very sophisticated and elaborate machine guards and guarding devices. Still this technology cannot always offer effective protection unless your employee knows the purpose of it and why. Further, as equipment models evolve, or used equipment enters the facility, or modifications to exiting machines are made, keeping up with proper guarding and associated work practices for operation and maintenance are vital.

This is also where the need for site specific, machine specific and detailed training comes into play. Your employees need to know your machines and the machine related hazards present at your facility.

Focused Training Topics - Machine Guarding

Effective employee training with respect to machine guarding should include instruction on the following:

- Proper safe machine operation as it was designed
- Identification of hazards associated with particular machines
- Specific guard rules (use, purpose, removal)
- Review and instruction on guarding requirements when assigned to new machinery
- Importance of following all safety procedures and techniques established
- Never remove guards unless authorized and machine is shut down and locked out
- How to report missing machine guards or damaged guards
- Never operate equipment unless all guards are in place and in working order
- Inspect and maintain machine guarding regularly
- Communicate clearly with affected and other employees

Focused Training Topics - Hazardous Energy Control

Effective employee training with respect to hazardous energy control should include instruction on the following:

For Authorized Employees:

- Understand the site specific hazardous energy control program
- How to recognize hazardous energy sources
- Types and magnitude of hazardous energy associated with applicable machinery
- Procedures and devices used for controlling hazardous energy
- How to use specific energy control procedures
- How to attach locks and tags
- The limitations of tags
- Procedures for removing locks and/or tags and returning a machine to operation
- How to handle shift changes and transfers
- Procedures for controlling cord and plug machinery
- Group lockout procedures
- Minor service and maintenance activities
- Communicate clearly with affected and other employees

For Affected and Other Employees:

- Recognition of when energy control procedures are being performed
- The purpose and use of the lockout/tagout procedures
- The importance of not attempting to start up or use locked out or tagged machinery
- The limitations of tags

Re-Training

As with any training aspect, the need to be re-trained will come up. Re-training should be conducted whenever the following circumstances occur:

- Changes in job assignment(s) that expose an employee to new hazards
- New procedures are established
- Changes with equipment or processes that present a new or different hazard
- When an employee demonstrates unsafe practices or performs an unauthorized procedure
- When periodic reviews reveals that corrective action is required

Assessing Your Operations

Once you understand why and where accidents can happen, you then need to see how your facility measures up. This involves performing an assessment of your machines, machine hazards, employee exposure, and methods for hazard control.

Never assume your operation is safe or compliant. You will only know if you assess your operation.

When it comes to assessments, you can conduct the assessments yourself or contract the service through an outside consultant.

The following are basic elements for a machine operation assessment:

Put Together Your Team

While you can conduct an assessment yourself, it can be more effective if you identify key staff and bring together the right employees to help in the assessment. Key staff would typically involve:

- Safety managers
- Production/Department managers
- Machine operators
- Maintenance personnel
- Electricians

Let them know the goal and purpose of the assessment and have them each perform a part of the assessment which best fits their position and area of responsibilities with machinery and production operations.

Know and Understand the Regulations

Safety and compliance should go hand-in-hand. If you are in compliance with the applicable regulations it will result in better protection for you, your employees, and your business.

And it's the law!

You have the responsibility to research the regulations and determine which ones apply to your specific facility and operations. Guessing at compliance, assuming, claiming ignorance, and even copying another company's safety program are not only unsafe, but they are never accepted excuses by the authorities.

Failure to comply with the required regulations can result in unnecessary injuries, stiff penalties and even civil lawsuits.

Understand ANSI & ISO Standards

As previously mentioned, both the ANSI and ISO standards are voluntary standards developed to address the design and application of safety features for machinery and the prevention of severe injuries like amputations.

Although it's not generally a regulatory requirement to follow these, some regulatory agencies will cite these standards by reference in their regulations or through enforcement actions. Therefore, getting familiar with these standards is advised.

Users of machines should reference these standards or before purchasing machines, require the equipment manufacturer/supplier to comply with the applicable standard to further ensure safe operations and better regulatory compliance.

Take Inventory

In order to conduct a thorough assessment and apply safety preventative measures to all powered machines, you need to know what machines are present in your operation, the operations and work practices, and associated written policies and programs. This is accomplished by taking a simple inventory of your existing powered machines, reviewing administrative records, and any reports of injuries and accidents – no matter how small, including close-calls.

Together this information will assist you in identifying issues and developing proper assessment coverage as well as a more focused approach on corrective actions and where they best apply.

Perform an Audit

For a global look at your operations with respect to powered machinery safety, it's recommended that you audit your operations and equipment. You can accomplish this by using the checklists we provide – see the downloadable resource documents provided as part of this guide - or by using other assessment tools you have available.

Additionally this can be part of a comprehensive safety compliance audit, either performed as a self-audit or through an outside consultant.

Depending on the size and configuration of your operations and the level of activities including shift work, it may be necessary to conduct the audits over several shifts, over several days or with different jobs to witness all of the functions of a machine, procedure, or certain work practice.

Using the awareness checklists allows you to find the more obvious "tips-of-the- ice berg" issues with regard to deficiencies, and then once identified, you can get into more detail for each, as necessary.

Identify Hazards

Any deficiencies observed from the checklist audit can represent actual or potential hazards. Therefore, further investigation would be warranted.

The best way to identify hazards with machinery is to observe a specific task or activity performed, or a specific machine in operation. Individual tasks can be associated with production operations, minor service activities, or when service and maintenance is being performed.

Ideally you would want to observe the task through the entire lifecycle of a job including setting up the equipment, running through typical production, any adjustments or troubleshooting, change-over, cleaning and housekeeping activities, and finally, shut down procedures.

Your goal with this step is to identify any hazards and employee exposures to the hazard, then identify any means to remove the hazard or reduce exposure to the hazard.

If you have multiple machines that are of the same type and model and perform the same jobs, you may be able to assess a sample of the machines and apply your findings to the remaining machines. However, to show due diligence, you should still investigate each machine to confirm the same safety features and controls and operations exist before relying on the assessment sampling.

Keep in mind that older machines may not have the same technology for safety devices and guards and some safety features may be in poor shape or missing all together. Further, new equipment may appear to be more complete in terms of guarding and safety devices, but that is not always the case. It is still the employers' responsibility to ensure that the equipment you purchase has all the necessary guards and safety devices to meet all regulatory requirements. See the topic of new equipment in the "A Word About Consensus Standard" section of this guide.

Noting Observations

Note any observations made through the checklist audit and hazard identification step and compare them to the applicable regulations and standards you initially identified. This comparison is called a gap analysis and should identify what is compliant within your operations and what has deficiencies.

Finally, make all necessary corrections for deficiencies discovered and implement the corrections into the operations function to prevent the deficiencies from occurring again. Follow up with management oversight and enforcement to ensure continued effectiveness and compliance.

What Your Employees Should Do

While this guide helps you, the employer, understand your responsibilities, it's important to re-emphasize that the employee has responsibilities as well.

Equipment manufacturers can design relatively safe machines and employers can implement safety programs, but hazards can still exist during operations and working on machinery. The risk of this never goes away or takes a holiday. Therefore the employee needs to keep aware and pay attention to what they are doing at all times.

Doing the right thing at the right time helps reduce the chances of an accident and the occasional close calls.

These points were covered under the "Conducting Employee Training" of this guide, but it pays to remind your employees to:

- Use the machines only if authorized and trained
- Use the machines only as designed
- Follow all safety rules
- Report all unsafe machinery or circumstances
- Be prepared for the unexpected
- Never horseplay around machinery and production areas
- Be a safety peer

References and Considerations

- Occupational Safety and Health Act (U.S.)
- General Industry Regulations (U.S.)
- Field Operations Manual
- Canadian Centre for Occupational Health and Safety
- Occupational Health and Safety Act (Canada)
- Occupational Health and Safety Regulations (Canada)
- Canadian Standards Association Z460-05 - Control of Hazardous Energy – Lockout and Other Methods
- Canadian Standards Association Z432-04 - Safeguarding of Machinery
- ANSI B65-1 - Graphic technology - Safety requirements for graphic technology equipment and systems - Part 1: General requirements
- ANSI B65-2 - Graphic technology - Safety requirements for graphic technology equipment and systems - Part 2: Prepress and press equipment and systems
- ANSI B65-3- Graphic technology - Safety requirements for graphic technology equipment and systems - Part 3: Binding and finishing equipment and systems
- ANSI B65-5 - Graphic technology - Safety requirements for graphic technology equipment and systems - Part 5:Stand-alone platen presses
- ANSI/ASSE Z244.1- Control of Hazardous Energy - Lockout/Tagout & Alternative Methods
- ANSI B155.1- Packaging Machinery and Packaging-Related Converting Machinery
- ANSI O1.1- Woodworking Machinery
- ISO 12643-1 - Graphic technology — Safety requirements for graphic technology equipment and systems — Part 1: General requirements
- ISO 12643- 2 -Graphic technology — Safety requirements for graphic technology equipment and systems — Part 2: Prepress and press equipment and systems
- ISO 12643-3 - Graphic technology — Safety requirements for graphic technology equipment and systems — Part 3: Binding and finishing equipment and systems
- ISO 12643-4 - Graphic technology — Safety requirements for graphic technology equipment and systems — Part 4: Converting equipment and systems
- ISO 12643-5 - Graphic technology — Safety requirements for graphic technology equipment and systems — Part 5: Stand-alone platen presses

Glossary

Affected Employee: An employee whose job assignment is on a machine where service or maintenance is being performed. An Affected Employee becomes and Authorized Employee when that employee's duties include performing service or maintenance and can demonstrate the proficiency to perform the hazardous energy control procedures specific pieces of machinery.

Alternative Protection: An alternative means of protection that is at least as effective as provided by energy control procedures (lock/tag).

Amputation: The loss of all or part of a limb or appendage.

Authorized Employee: An employee trained and authorized for the use of energy control procedures during service and maintenance activities.

American National Standards Institute (ANSI): The coordinating body of various trade, technical, professional, and consumer groups who develop voluntary standards directly impacting specific industries.

Emergency Stop: A manually actuated control device used to initiate an emergency stop function on equipment.

Energy Control Procedure: A written document that outlines the necessary steps to shut down and control hazardous energy prior to performing service and maintenance.

Energy Isolating Device: A mechanical device that physically prevents the transmission or release of energy (i.e., circuit breaker, disconnect switch, blocking, etc.).

Exposure: The reasonable likelihood that an employee is or will be subject to a safety hazard.

Flywheels: A component of a machine that includes balance wheels, and flywheel pulleys.

Hazard Area: An area within or around machinery which poses a risk of injury to a person.

Hazardous Energy Source: Any hazardous source of energy such as electrical, mechanical, hydraulic, and pneumatic use to power equipment.

Inch-Safe-Service: An alternative method of hazard control that can offer protection when performing minor service tasks.

In-Running Nip: The area created by either two rotating components which are rotating inward, or one rotating component rotating toward an adjacent surface.

Interlock: A lower level safety device that is designed to stop a machines motion when activated or moved out of position.

International Organization for Standardization (ISO): An independent, non-governmental international organization that develops voluntary, consensus-based, standards and guidelines directly impacting specific industries

Lock: A keyed device used for locking out an energy isolating device.

Lockout: The placement of a lockout device and lock on an energy isolating device.

Lockout Device: A device that accepts a lock to hold the device in a safe position.

Lockout/ Tagout: A procedure to control hazardous energy with a lock and tag designed to protect employees from an accidental discharge of energy or movement of machinery parts when performing service and maintenance.

Minor Service: Tasks performed during normal production operations that are considered routine, repetitive and integral to production.

Normal Production: The normal operations performed to manufacture a product.

Other Employee: An employee whose work operations may potentially expose them to energy control procedures being performed.

Pinch Point: Any point within a machine at which it is possible for a body part to be caught between.

Safety Device: A safety control that prevents an operator from reaching into the point of operation or prevents machine movement from inadvertently exposure to a point of operation.

Servicing and Maintenance: Extensive service tasks performed during normal production operations that are generally applied when it is necessary to remove or bypass a guard or other safety device, or it is necessary to place a body part into a point of operation.

Special Tool: Any tool designed for the safe placement or removal of material or parts within or from the point of operation.

Stop/Safe Device: A manually actuated control device used to initiate a stop function on machinery and place the machine into a safe mode.

Tagout: The use of a tag on an energy isolating device to visibly indicate that a machine is being serviced and identify the authorized employee performing the service.